

REMARKS

The Examiner is thanked for the thorough examination of the above-referenced application. Claims 19, 34, and 41 have been amended, and claim 42 is newly added, and as amended these claims clearly define over the cited art of record. Applicants submit that no new matter has been added to the application by these amendments.

Independent claim 19 has been amended to more clearly identify a non-obvious feature of the claimed invention. Specifically, claim 19 has been amended to modify the limitation "a carbon and nitrogen-doped silicon oxide, serving as an etching stop layer, overlying the insulating layer and the conductive plug". Support for this limitation can be found at least on page 6 lines 6-14 of the application and in Fig. 4.

Independent claim 34 has been amended to more clearly identify a non-obvious feature of the claimed invention. Specifically, claim 34 is amended to recite the feature of "a diffusion layer lining the trench". Support for this limitation can be found at least on page 7 lines 16-19 and 23-25 of the application and in Fig. 6.

Independent claim 41 has been amended to modify the limitation "the diffusion layer comprises Ta and/or TaN".

Finally, claim 42 has been added to more clearly identify a non-obvious feature of the claimed invention. Among other limitations, newly added claim 42 includes the feature of "a diffusion layer lining the trench," which was also added to claim 34. Again, support for this limitation can be found at least on page 7 lines 16-19 and 22-25 of the application and in Fig. 6.

Discussion of Rejections Under 35 U.S.C. 112

Claim 41 was rejected under 35 U.S.C. 112, second paragraph, as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants have amended claim 41 to address and overcome this rejection.

Discussion of Rejections Under 35 U.S.C. 103(a)

Claims 19, 20, 22-25, 27-30, 33 were tentatively rejected under 35 U.S.C. 103(a) as allegedly unpatentable over US PUB 2004/0077181 to Choo et al. Claims 21, 31-32, 34-41 were tentatively rejected under 35 U.S.C. 103(a) as allegedly unpatentable over US PUB 2004/0077181 to Choo et al in view of US 6566701 to Agarwal. Applicants respectfully traverse the rejections for at least the reasons discussed below.

Choo and Agarwal, standing alone or in combination, fail to disclose, teach, or suggest the limitations “a carbon and nitrogen-doped silicon oxide, serving as an etching stop layer, overlying the insulating layer and the conductive plug.” and “a diffusion layer lining the trench.” recited in the amended claims 19, 34 and the added claim 42.

Claim 19, as amended, defines a carbon and nitrogen-doped silicon oxide serving as an etching stop layer disposed between dielectric layers. Simply stated, this feature is neither disclosed nor suggested in the cited art. Claim 34 (as amended) and the added claim 42 each define “a diffusion layer lining the trench.” This feature is neither taught nor disclosed in the cited art. Moreover, a carbon and nitrogen-doped silicon oxide, serving as an etching stop layer between regular-k and low-k dielectric, provides better adhesion/glue capability than SiC. The carbon-doped silicon oxide has a relatively low k-value than SiC. In addition, a diffusion layer is

capable of blocking copper out-diffusion. All of the above-referenced features distinguish the claimed invention over the cited art of record.

Choo discloses a SiCO film as an etch stop layer. Significantly, Choo does not disclose a carbon and nitrogen-doped silicon oxide serving as an etching stop layer, as recited in the claimed invention. Further, neither Choo nor Agarwal disclose a diffusion layer lining the trench, as recited in independent claims 34 and 42.

Under MPEP 2143, to establish a *prima facie* case of obviousness, the prior art reference, or references when combined, must teach or suggest all the claim limitations. As the cited references do not teach the above-quoted limitations of the independent claims (as amended) 19 and 34, or the added claim 42, Applicants respectfully submit that independent claims 19, 34, and 42 define over the art and should be allowed. Claims 20-25, 27-33, and 35-41 should also be allowed, at least by virtue of their dependency from the amended claims 19 and 34, respectively.

Cited Art of Record

The cited art of record has been considered, but is not believed to affect the patentability of the presently pending claims.

CONCLUSION

In light of the foregoing amendments and for at least the reasons set forth above, Applicant respectfully submits that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the now pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would

expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,



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